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Cross cultural adaptation and psychometric validation of the Generalized Anxiety Disorder Assessment-7 for Urdu-speaking clinical populations

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Key words: generalized anxiety disorder, Urdu GAD-7, cultural adaptation, psychometric validation, Pakistan.

Abstract

Anxiety disorders are a major public health concern in low- and middle-income countries due to the lack of culturally validated screening tools. Although the Generalized Anxiety Disorder Assessment-7 (GAD-7) is widely used, limited research exists on its cross-cultural psychometric validation in Pakistan. This study aimed to translate, culturally adapt, and psychometrically validate the GAD-7 in a Pakistani clinical population. Following a standard forward–reconciliation–backward translation procedure, the GAD-7 was translated into Urdu and reviewed by a multidisciplinary expert panel. The final version was administered to 267 participants. Exploratory and confirmatory factor analyses were conducted. Internal consistency and model fit indices were assessed. Criterion validity was evaluated using Receiver Operating Characteristic analysis. The adapted GAD-7 demonstrated high internal consistency (Cronbach's $\alpha = 0.896$). Confirmatory factor analysis indicated both models demonstrated excellent fit; however, one-factor model was retained as the more parsimonious solution. Factor loadings were statistically significant and within acceptable ranges. ROC analysis demonstrated

excellent diagnostic accuracy (AUC = 0.970), with an optimal cutoff score of 10 yielding sensitivity of 98.6% and specificity of 81.4%. The Urdu GAD-7 is a reliable, valid, and clinically useful instrument for screening anxiety in Pakistani populations. While multidimensional representations may offer theoretical insight, the scale functions effectively as a unidimensional measure. The findings support its use in both clinical and research settings, particularly for early detection of anxiety in resource-limited contexts.

Introduction

Anxiety disorders are among the most prevalent psychiatric conditions globally, affecting millions and contributing substantially to the global disease burden.[1] Globally, 932 million prevalent cases of anxiety disorders were reported that resulted in 380.62 million disability-adjusted life years.[2] These figures underscore the urgent public health imperative to address anxiety disorders. Nevertheless, effective management is contingent upon precise assessment and diagnosis, the foundational cornerstone of treatment.

To facilitate accurate anxiety diagnosis, standardized tools such as the Beck Anxiety Inventory[3] and Hamilton Anxiety Rating Scale,[4] have been developed. Among these, the Generalized Anxiety Disorder-7 (GAD-7) has emerged as particularly valuable, combining simplicity with scientific rigor for epidemiological research, clinical practice, and population screening.[5] The GAD-7 has been widely adopted globally, achieving remarkable cross-cultural penetration through translations in over 20 languages, including Arabic, Urdu, Bengali, Chinese, and Spanish.[6] Nevertheless, a critical research gap remains: the urgent need for culturally adapted psychometric validation of the GAD-7 in Pakistan. The existing Urdu version lacks comprehensive psychometric evaluation, and no formal cross-cultural adaptation has been conducted.[7] This gap is particularly concerning given the alarmingly high rates of anxiety disorders in Pakistan, especially a recent survey of 17,773 adults revealed that 24.81% had reported anxiety symptoms.[8] Another study of 9,331 adults found that 31% of men and 59.3% of women experienced anxiety.[9] These staggering prevalence rates underscore the critical need for culturally validated assessment tools in Pakistan.

Moreover, in Pakistani anxiety symptoms are commonly experienced and expressed through somatic or culturally specific idioms of distress.[10,11] For instance, individuals may report feeling that "my heart is restless" rather than "I am restless," or attribute symptoms to supernatural causes such as "evil eye" rather than recognizing them as manifestations of mental distress. Although such expressions reflect actual distress, they may not align directly with Western conceptualizations of worry or nervousness as

captured by instruments like the GAD-7. Given cross-cultural variation in item interpretation, simple linguistic translation is insufficient; culturally informed adaptation is necessary to ensure conceptual equivalence. Accordingly, the present study prioritized refining item phrasing to capture locally relevant anxiety expressions while preserving construct validity, thereby enhancing interpretability and diagnostic precision of the Urdu GAD-7 in the Pakistani context.

Given this context, the present study aimed to linguistically translate, culturally adapt, and psychometrically validate the GAD-7 for the Pakistani population, with the following objectives: i) to develop an idiomatic Urdu version of the GAD-7 using a rigorous cross-cultural adaptation process; ii) to evaluate its internal consistency reliability; iii) to examine its factorial structure by testing both a one-factor model and a theoretically informed two-factor model distinguishing cognitive–affective and somatic dimensions; iv) to assess construct validity through factor loadings and inter-factor correlations.

Furthermore, based on prior literature, such as those by Ahmad *et al.,*[12] Beard & Björgvinsson,[13] and Müller *et al.*,[14] the present study formulates the following hypotheses: i) the Urdu GAD-7 will demonstrate high internal consistency reliability; ii) the one-factor model will demonstrate acceptable model fit and may represent a parsimonious structure compared to the two-factor model; iii) factor loadings for all items will be statistically significant and within acceptable ranges; iv) the correlation between cognitive–affective and somatic factors will be high, supporting related but distinct constructs.

Materials and Methods

Research design

This study employed a cross-sectional exploratory sequential mixed-method design[15,16] in two sequential phases: first, translation and cultural adaptation of the GAD-7 in a qualitative exploratory phase; second, psychometric validation in a descriptive quantitative phase.

Population of study

The population of this study included adult individuals receiving treatment for depressive and anxiety symptoms at private psychiatric clinics across four Pakistani locations: three urban centers (Peshawar, Abbottabad, and Islamabad) and one rural area (District Karak). Participants were recruited through consecutive sampling,[17] enrolling all consecutive cases meeting the inclusion criteria until the target sample size of 267 was attained. Sample size adequacy was justified using the respondent-to-item ratio recommended for psychometric validation studies, expressed as $N=k\times r$, where N represents the

minimum required sample, k the number of items, and $r$the respondent-to-item ratio. A commonly recommended ratio ranges from 5:1 to 10:1.[18] Furthermore, beyond ratio-based guidance, the sample size meets broader structural equational modeling recommendations, which generally consider $N \geq 200$ sufficient for stable parameter estimation in confirmatory factor analysis.[19,20] Hence, the final sample size (n = 267) met the recommended threshold, ensuring stable parameter estimation and reliable model fit. The adapted GAD-7 was administered during routine history-taking with therapist assistance.

Inclusion and exclusion criteria

The inclusion criteria are given below: i) adults aged between 18 and 50 years; ii) fluent in Urdu language (reading and speaking); iii) exhibiting anxiety symptoms based on presenting complaints and clinical judgment identified during the initial clinical assessment and diagnostic interview; iv) willing and able to provide informed consent; v) both male and female patients.

Moreover, the exclusion criteria include following: i) individuals diagnosed with severe psychiatric conditions that may impair comprehension or response accuracy; ii) individuals with severe or unstable medical or neurological conditions that could confound somatic symptom reporting; iii) individuals currently experiencing substance intoxication or withdrawal.

Data collection

First, forward-reconciliation-backward translation methodology[21,22] was used. The GAD-7 was independently translated from English to Urdu by two bilingual experts; their versions were reconciled into a consensus translation, which was then back-translated to English by two different bilingual experts blinded to the original scale. A multidisciplinary panel (one psychiatrist, two clinical psychologists, and two linguists) then evaluated the Urdu translation for semantic, conceptual, and cultural appropriateness, providing recommendations and approving the final version. In the next phase, a purposive sample of ten Urdu-speaking individuals with anxiety symptoms completed the translated version, reporting positive feedback regarding language clarity and ease of administration. For quantitative data collection, the Urdu GAD-7 was administered across four clinical sites in Pakistan, with all 264 participants successfully completing the adapted scale.

Data analysis techniques

Qualitative exploratory data were analyzed using content analysis methodology.[23] Item-wise feedback was analyzed to identify unclear wording, cultural mismatches, or misinterpretations, ensuring

linguistic clarity, cultural appropriateness, semantic equivalence, and conceptual relevance. Quantitative data related to demographics was analyzed by descriptive statistics. Reliability was analyzed by item-total correlations, with ≥ 0.30 threshold[24] and Cronbach's Alpha coefficients, ≥0.60 threshold.[25] Construct validity was assessed using exploratory factor analysis, evaluating factor loadings, eigenvalues, and communalities with a predetermined factor retention threshold of 0.50 The Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity were also examined.[26] Confirmatory Factor Analysis (CFA) within a structural equation modeling framework was conducted using a robust weighted least squares estimator, appropriate for ordinal Likert-scale data.[27] Model fit was evaluated using multiple indices: chi-square (χ^2), Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA) with 90% confidence interval, and Standardized Root Mean Square Residual (SRMR). Acceptable fit was defined as CFI and TLI ≥ 0.90 (preferably ≥ 0.95), RMSEA ≤ 0.06–0.08, and SRMR ≤ 0.08. Additionally, measurement invariance across age groups was assessed using multi-group CFA.

Due to unequal distribution across original age categories, age was collapsed into two groups: younger adults (n = 177) and older adults (n = 87). Configural, metric, and scalar invariance models were tested sequentially, with ΔCFI ≤ 0.01 indicating invariance. The dimensional structure was analyzed following established methodological procedures (e.g., both one-factor and two-factor solutions). Descriptive statistics and reliability analyses were conducted using IBM SPSS (Version 21); CFA was implemented in R using the lavaan package.

Ethical approval

This study constituted a sub-component of a larger research project that received ethical approval from the Human Research Ethics Committee of Universiti Malaysia Sarawak, Malaysia. Additional ethical approval for this specific sub-study was obtained from the Ethics Review Committee of Khushal Khan Khattak University (Ref. No. 12/ERC/11-23; 6 November 2023). Written informed consent was obtained from all participants prior to data collection.

Results

Phase one: exploratory and qualitative analysis

The study followed a standard forward-reconciliation-backward translation protocol. Two bilingual experts independently translated the English GAD-7 into Urdu; their versions were reconciled into a consensus translation. Two different bilingual experts, blinded to the original scale, then back-

translated this Urdu version to English, ensuring linguistic accuracy and conceptual equivalence. Subsequently, the multidisciplinary evaluation panel rigorously reviewed the translated Urdu GAD-7 for semantic equivalence, conceptual clarity, and cultural relevance. The panel reached high agreement on the semantic and conceptual accuracy of all items but offered the following recommendations for further improvement:

First, the concept of "on edge" lacks a direct cultural parallel in Urdu; many patients may not recognize this metaphorical expression. Similarly, "nervous" could be misinterpreted as referring solely to physical shakiness rather than psychological unease. The panel recommended rendering "on edge" as "a vague sense of unease" or "inability to feel calm or settled," and "nervous" as "a feeling of being overwhelmed" or "a feeling of unease in the chest."

Second, while the concept of "control" is generally understandable, among lower-literacy patients it may be interpreted in behavioral terms (e.g., physically stopping an action) rather than as a cognitive process, potentially blurring the distinction between "stop" and "control."

The phrase "different things" is vague in Urdu. In Pakistani culture, worries are typically framed within social or religious contexts. A more accurate Urdu expression would be *"*every minor and major issue", which better captures the intended meaning.

Fourth, the concept of "relaxing" is culturally ambiguous in Urdu, as relaxation may be associated with idleness. Therefore, culturally resonant phrases such as "to bring peace to the heart" or "to create calmness in the heart" were recommended.

Fifth, "restlessness" is well understood in Urdu, however, phrase "sitting still" may be disproportionately associated with physical inactivity. To enhance conceptual accuracy, the translation should emphasize the internal state of restlessness

Sixth, the expression of "annoyance and irritability" is often gendered in Pakistani culture; women and children may underreport these emotions due to norms emphasizing "patience". To improve accurate reporting, culturally resonant phrases such as "feeling hurt in one's heart" or "internalized resentment" were recommended.

Following this rigorous review process, the expert panel formally endorsed and approved the final Urdu adaptation of the GAD-7 scale (see Supplementary File A for the complete Urdu version).

Phase two: descriptive and quantitative analysis

Missing value analysis

Prior to analysis, data were screened for missing values using missing value analysis procedure of SPSS. As all participants successfully completed the adapted GAD-7 during supervised administration, no missing data were observed.

Demographic profile

The sample (n = 267) was predominantly female (60.2%; male = 39.8%), with ages ranging from 18 to 50 years and the majority concentrated in the 18–25 (35.2%) and 26–30 (31.8%) year brackets. Educational attainment varied: 18.2% primary, 31.1% secondary, 25.4% intermediate, and 25.4% graduate or higher. All participants were recruited from psychiatric outpatient settings and presented with clinically confirmed anxiety symptoms based on initial assessment. Collectively, demographic and clinical diversity of the sample, drawn from multiple urban and semi-urban Pakistani sites, supports its representativeness.

Reliability analysis

The adapted scale demonstrated good internal consistency, with a Cronbach's α of 0.896 for all 7 items. For each subscale, Cronbach's alpha and item-total correlations were calculated to evaluate dimensional reliability. As seen in Table 1, it indicates good internal consistency and reliability of the adapted GAD-7.

Validity analysis

Exploratory factor analysis

The dimensionality of the adapted GAD-7 was examined using exploratory factor analysis, following methodological approaches established in recent seminal work by Moreno *et al*.[28] and Riglea *et al.*[29] Exploratory factor analysis of the adapted GAD-7 confirmed appropriate factorability, with excellent sampling adequacy (KMO = 0.911) and significant item inter-correlations (Bartlett's test of sphericity: $\chi^2[21] = 940.54$, $p < .001$). Separate EFAs were conducted for each identified dimension (Table 2). For the Affective dimension, KMO = 0.819, Bartlett's test was significant (χ^2 [6] = 434.40, $p < 0.001$), communalities ranged from 0.648 to 0.719, and factor loadings from 0.801 to 0.849, confirming adequate representation by a single underlying factor. For the Somatic dimension, KMO = 0.689 (somewhat low), Bartlett's test was significant (χ^2 [3] = 172.74, $p < 0.001$), communalities ranged from 0.645 to 0.679, and factor loadings from 0.802 to 0.845, indicating coherent clustering around a single latent construct as seen in Table 2.

Confirmatory factor analysis

Confirmatory factor analysis (CFA) using a robust weighted least squares estimator (see Table 3) showed that the one-factor model demonstrated excellent fit: $\chi^2(14) = 21.84$, $\chi^2/df = 1.56$, CFI = 0.992, TLI = 0.989, RMSEA = 0.042 (90% CI: 0.018–0.064), SRMR = 0.031. The two-factor model (cognitive/affective vs. somatic) also showed excellent fit: $\chi^2(13) = 16.12$, $\chi^2/df = 1.24$, CFI = 0.996, TLI = 0.994, RMSEA = 0.028 (90% CI: 0.000–0.052), SRMR = 0.024. However, the two factors were highly correlated (r=0.88), indicating substantial overlap and limited discriminant validity. Given the marginal improvement in fit relative to added complexity, the one-factor model was retained as the more parsimonious and theoretically consistent representation.

Finally, measurement invariance across age groups was examined using multi-group CFA with a robust weighted least squares estimator. Age categories collapsed into younger (n = 177) and older adults (n = 87). The configural model demonstrated good fit, and constraining factor loadings (metric invariance) and item thresholds (scalar invariance) yielded negligible changes in fit (ΔCFI = 0.001 for both), supporting full measurement invariance (Table 4). These findings confirm that the Urdu GAD-7 functions equivalently across younger and older adults, enabling valid score comparisons between age groups.

Criterion validity and diagnostic accuracy

Receiver Operating Characteristic analysis, using clinician-based diagnoses from structured clinical interviews as the reference standard, revealed excellent diagnostic accuracy (AUC = 0.970). As shown in Table 5, the optimal cutoff score was 10, yielding a sensitivity of 98.6% and specificity of 81.4%. These findings support a cutoff score of 10 for identifying clinically significant anxiety in the Pakistani population.

The overall findings fully support the proposed hypotheses. The Urdu GAD-7 demonstrated high internal consistency, confirming Hypothesis 1. Both one-factor and two-factor models showed acceptable fit; the more parsimonious one-factor solution was retained, supporting Hypothesis 2. All factor loadings were statistically significant and within acceptable ranges, supporting Hypothesis 3. The correlation between cognitive–affective and somatic dimensions in the two-factor model offers support for Hypothesis 4.

Discussion

The present study is the first comprehensive effort to linguistically translate and psychometrically validate the GAD-7 for clinical use in Pakistan. Despite its widespread international use, the scale has undergone limited cross-cultural validation in the country; prior translations, e.g., Ahmad *et al.*[7] have not systematically examined its psychometric properties. This study addresses this gap by providing a cultural adaption alongside rigorous psychometric validation in a Pakistani clinical population.

The significant insight is that the one-factor model of the Urdu GAD-7 demonstrated a clinically meaningful and statistically stable factor structure in a Pakistani sample. Nevertheless, the two-factor structure also offered a theoretically informative representation of anxiety. Differentiating symptom domains may facilitate more nuanced clinical formulation, particularly in South Asian contexts where somatic distress is highly prevalent, and could help clinicians tailor interventions, for example, addressing cognitive symptoms via restructuring techniques while targeting somatic symptoms through relaxation or body-focused approaches. Beyond structural validation, the Urdu GAD-7 demonstrated strong diagnostic performance. ROC analysis against clinician-based diagnoses yielded excellent discriminatory ability (AUC = 0.970), with an optimal cutoff of 10 achieving 98.6% sensitivity and 81.4% specificity. These findings align with international studies that support the cross-cultural robustness of this cutoff.[5]

These findings contribute to the growing literature on cross-cultural variation in the factor structure of the GAD-7. While several South Asian validations support a two-factor structure (29), research in heterogeneous populations has consistently reported a unidimensional model (28), suggesting that cultural context may influence how anxiety symptoms are expressed. These results therefore underscore the need for culturally adapted diagnostic tools in Pakistan, where mental health assessment often occurs through culturally specific idioms of distress.

This study makes several contributions. First, it establishes the psychometrically validated factor structure of the Urdu-adapted GAD-7, providing the first comprehensive evidence of its dimensional stability in the Pakistani cultural context. Second, the findings demonstrate the clinical relevance of Urdu-adapted GAD-7 by capturing culturally specific symptom patterns that characterize anxiety presentations in this population. Most importantly, this study enables Pakistani clinicians to improve diagnostic precision through culturally grounded assessment tools while facilitating the development of more effective, contextually appropriate treatment strategies for anxiety disorders.

Limitations

While this study provides valuable contributions, several limitations warrant consideration.

Limited generalizability

The urban sampling frame may not fully represent Pakistani diverse populations, particularly rural communities where symptom expression and healthcare access differ substantially. Future studies should employ stratified sampling across urban, peri-urban, and rural regions.

Unassessed psychometric properties

In the current study, test–retest reliability was not assessed due to logistical constraints related to follow-up in clinical settings. Subsequent research should incorporate longitudinal designs to establish these essential psychometric parameters.

Need for further validation

Additional psychometric evaluations are needed. Moreover, concurrent validity should be established in comparison to local instruments like the Aga Khan University Anxiety and Depression Scale[30] and discriminant validity against physical health conditions with overlapping symptomatology.

No comparator

The present study did not include a comparator instrument to assess convergent and discriminant validity. Given the absence of a comparator instrument, construct validity was evaluated through factor loadings and inter-factor correlations, which are accepted internal indicators in psychometric validation studies. Future research should incorporate established measures of anxiety and related constructs to further evaluate the external validity of the Urdu GAD-7.

Conclusions

The present study represents a significant advancement in culturally sensitive mental health assessment in Pakistan. Employing a rigorous two-phase methodology comprising idiomatic translation and psychometric validation, this research produced an Urdu version of the GAD-7 that is both statistically robust and clinically relevant for local contexts. Confirmatory factor analysis supported both one-factor and two-factor structures, with the latter revealing distinct cognitive–affective and somatic symptom dimensions. Notably, the prominence of somatic symptoms underscores the culturally specific ways in which psychological distress is expressed in South Asian populations, reinforcing the necessity of integrating cultural insight into psychiatric assessment without compromising methodological rigor. In sum, while anxiety is globally recognized, its valid measurement must be locally grounded. With this

validated tool, Pakistan now possesses a reliable and contextually appropriate instrument for the screening and early detection of generalized anxiety. Future implementation research should explore training healthcare providers in the use of this adapted GAD-7 across diverse clinical and community-based settings in Pakistan.

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Ethics approval: This study constituted a sub-component of a larger research project that received ethical approval from the Human Research Ethics Committee of Universiti Malaysia Sarawak, Malaysia. Additional ethical approval for this specific sub-study was obtained from the Ethics Review Committee of Khushal Khan Khattak University (Ref. No. 12/ERC/11-23; 6 November 2023). Written informed consent was obtained from all participants prior to data collection.

Consent to participate: all procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Written informed consent was obtained from all participants at the start of the study.

Data availability: the data supporting this study are available from the corresponding author upon reasonable request. The data are not publicly available due to privacy or ethical considerations.

Contributions: Anwar Khan and Iftikhar Ali did the conceptualization of the study, conducted the literature review, synthesized the thematic findings, and developed the final draft of manuscript. Amalia Madihie supervised the research process, provided critical guidance, thoroughly reviewed the final draft, offered substantial technical input, and enhanced the academic rigor and clarity of the manuscript. All authors commented on previous versions of the manuscript. All authors read and approved the final version of the manuscript prior to submission.

Table 1. Reliability statistics of GAD-7 scale.

Dimensions	**Item-Total Correlations**	**Cronbach's Alpha Coefficients**
Affective Symptoms Item 1	0.709	0.849
Affective Symptoms Item 2	0.729	
Affective Symptoms Item 3	0.724	
Affective Symptoms Item 7	0.663	
Somatic Symptoms Item 4	0.578	0.736
Somatic Symptoms Item 5	0.756	
Somatic Symptoms Item 6	0.735	

Table 2. Results of exploratory factor analysis.

Dimensions	**Communalities Extraction and Factor Loadings**
Affective Dimension	Communalities Extracted
KMO Value= 0.819.	0.648
Bartlett's Test of Sphericity= (χ^2 [df:6] =	0.699
434.40, $p < 0.001$)	0.701
	0.716
	Factor Loadings
	0.846
	0.837

	0.836
	0.805
Somatic Dimension	Communalities Extracted
KMO Value=0.688	0.678
Bartlett's Test of Sphericity= (χ^2 [df:3]:	0.657
172.74, p= p < 0.001).	0.645
	Factor Loadings
	0.826
	0.812
	0.801

Table 3. Model fit analysis.

Model	**χ^2**	**df**	**χ^2/df**	**RMSEA (90% CI)**	**SRMR**	**CFI**	**TLI**
One-factor	21.84	14	1.56	0.042 (0.018–0.064)	0.031	0.992	0.989
Two-factor	16.12	13	1.24	0.028 (0.000–0.052)	0.024	0.996	0.994

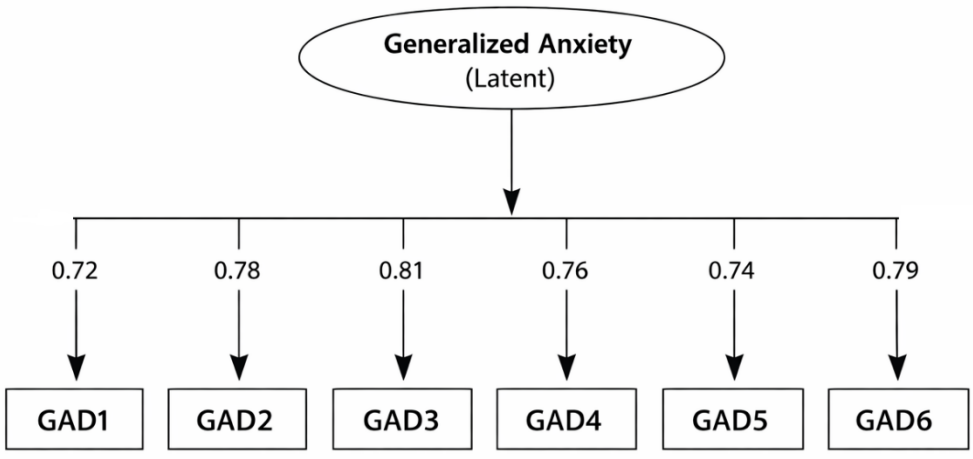

Figure 1. Model fit diagram for one factor model.

Table 4. Measurement invariance across age groups.

Model	χ^2	df	CFI	TLI	RMSEA (90% CI)	ΔCFI
Configural	38.52	28	0.995	0.992	0.036 (0.018–0.052)	—
Metric	41.73	34	0.994	0.993	0.031 (0.015–0.047)	0.001
Scalar	46.85	40	0.993	0.994	0.028 (0.012–0.043)	0.001

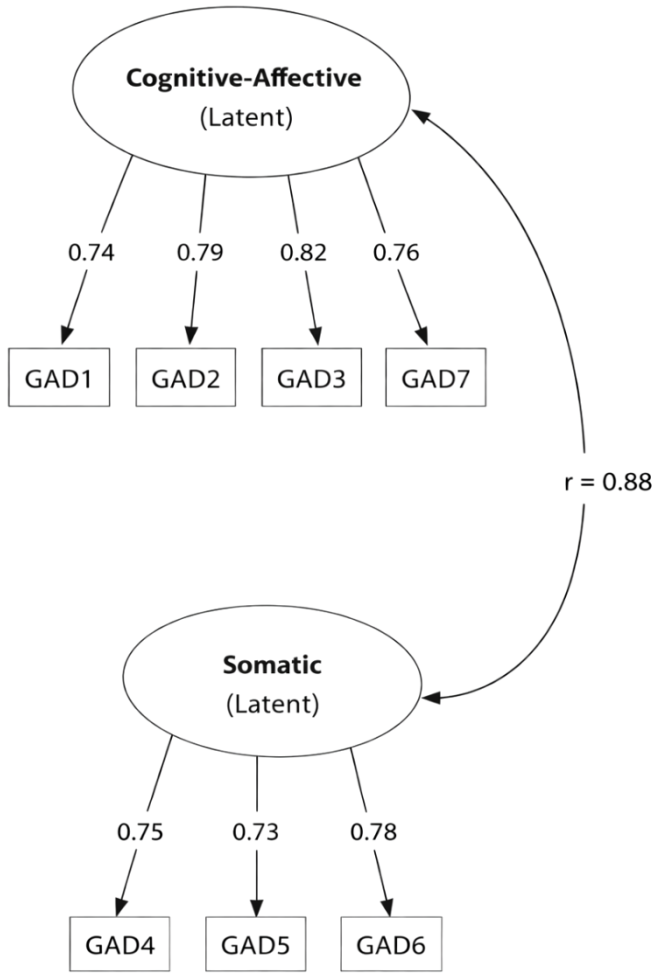

Figure 2. Model fit diagram for two-factor model.

Table 5. Diagnostic accuracy analysis of Urdu GAD-7.

Cut-off Score	Sensitivity (%)	Specificity (%)	Youden Index
≥ 8	100.0	62.7	0.627
≥ 9	99.3	72.9	0.722
≥ 10	**97.6**	**81.4**	**0.800**
≥ 11	95.2	88.1	0.833
≥ 12	91.8	91.5	0.833

Online supplementary materials

Cultural Adapted Version of Generalized Anxiety Disorder 7 items Scale as Supplementary File A